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TSETSE FLY CONTROL

A paper by

K. R. S. MORRIS, D.Sc.

lately Director of the Department of Tsetse Control, Gold Coast, read to the Commonwealth Section of the Society on Tuesday, 24th February, 1953, with J. W. Munro, C.B.E., M.A., D.Sc., Professor of Zoology and Applied Entomology, Imperial College of Science and Technology, in the Chair

THE CHAIRMAN: It is an especial pleasure and honour for me to take the Chair this evening, and the reason is that the lecturer is one of my old students of whom we, in the Imperial College, are particularly proud.

Dr. Morris could talk to you in great detail about his work, and he could go into quite erudite scientific questions, but I think what he is going to do is to give you a general picture of what he has done; and what he has done is quite remarkable. It is not only remarkable scientifically, in that he has used his knowledge of vegetation, and the relationship of the insect to vegetation, to make a marked impression in the reduction of tsetse fly; before he could even begin that work he had to study human relations. I think—he will say nothing of this—the remarkable thing about Dr. Morris's work is that, as a layman, he went into territory which the medical profession rather jealously guarded as theirs, and, I will not say he defeated the medical people, but he did succeed in getting things done in spite of them.

I think the great merit of Dr. Morris's work is that by first establishing human relations he made it possible to study animal relations and, having studied them, to produce a practical result.

The following paper, which was illustrated with lantern slides, was then read:

THE PAPER

Practically the whole tropical zone of Africa, from the line of the French and English Sudans in the north, right down to the southern limits of the Congo forests and the Zambesi, is affected in one way or another by the presence of the tsetse fly.

Instead of attempting to give you the whole of this vast picture, I will give you the story of just one facet, that of sleeping sickness in West Africa. The problem is big enough even then, yet it centres on the presence of one tiny insect, the tsetse fly, about the size of a bluebottle, and of a microscopic protozoon, the trypanosome, which is carried by this fly. It is this trypanosome which causes the fatal disease of sleeping sickness in man, and closely allied species give rise to diseases of the nagana type in cattle, horses, sheep and pigs. The important thing to remember, in fact the key to the whole problem and to methods for its solution, is that the tsetse fly alone is quite harmless; it is only after it has bitten an infected person, in the case of sleeping sickness, or an animal for nagana, that the fly becomes a danger. Even then it is by no means certain that every fly will become infected on biting an infected person, nor that every infected fly will pass on the disease, so the conditions for the transmission of sleeping sickness are quite limited. This is just as well, because throughout tropical Africa there are thousands of people being bitten by thousands of tsetse every day, and if the disease were spread as easily as all that it would have wiped out the populations of most of that region long ago. This is a very important point, as will come out later in the talk.

Sleeping sickness in its typical stages is spectacular: the infected person becomes so drowsy that he will fall asleep while talking to you, or while eating a meal. But this is an advanced stage in what is a very prolonged disease which may last three or four years; indeed a case is known of a person being infected for seven years. The early symptons are merely headaches, fever, and a feeling of being off colour, such common events to the African that they attract neither the notice of the patient himself nor of his relations. Now this is one of the great dangers. It promotes the spread of sleeping sickness, since a sufferer may walk about for years infecting tsetse fly in many different places, and it works against the doctor and his chances of successful cure. For in the late and typical stages, cure is by no means a certainty, whereas in the early stages, when cure is more certain, diagnosis is difficult. The only sure diagnosis is by the microscope. But when there are hundreds of cases spread over areas thousands of square miles in extent, without communications—no buses, no trains—you do not get your patients, who hardly realize they are ill, walking thirty or forty miles to the one hospital just to have their blood examined. If they really feel ill enough, and can afford the fee of a chicken, a goat or a bundle of yams, they will certainly go to the nearest bush doctor, in whom they have the faith of long familiarity.

So if the epidemics, which were covering thousands of square miles of West Africa by the 1930's, were to be tackled properly it was no good waiting for the patients to come in, it was necessary to take our cures to them, and to make treatment as easy and as efficient as possible. It was a Frenchman, Dr. Jamot, working in the terribly infected country of the Cameroons, who first put this idea into practice and developed the system of mass treatment. Teams of Africans are trained in precise methods of diagnosing the disease, involving examination of stained blood smears under the microscope, and in the preparation, under

African sleeping sickness. The trypanosome invades the blood stream and, eventually, the central nervous system of the patient

sterile conditions, of the drugs and their administration by injection. All these processes are carried out under the rough and ready conditions of the bush, so that the teams can travel round the country, visiting every village, examining every man, woman and child, and giving the proper course of treatment to those who are found infected.

This mass treatment was soon taken up in the British colonies of Nigeria and the Gold Coast, and had wonderful results in reducing the epidemics to quite low levels. But this method alone was not able to finish the job, that is to say to wipe out the disease. Inevitably some cases were missed, some were incompletely cured, others moved in from areas not yet dealt with. And while the tsetse was there to pass on the infection the disease remained, not in spectacular amounts, but still a menace, and required constant vigilance lest a renewed flare-up should occur.

It is as well, at this point, to bear in mind the magnitude this problem attained in West Africa. At the peak of the epidemic in Northern Nigeria 84,364 cases of sleeping sickness were treated in one year, 1935. The epidemic with which I was concerned spread across 60,000 square miles of country, most of it in the French territories of the Ivory Coast and Upper Volta, but involving also a good part of the north of the Gold Coast. About half of this whole area had infection rates

ranging from five per cent to over fifteen per cent, and in one district alone 100,000 people were lost between 1912 and 1940. But perhaps the most serious aspects of the problem arose from the fact that the tsetse which carry this fatal disease and, it must be remembered, also the nagana sicknesses of cattle, occupy the very places which are most precious to the people of the African hinterland, the riversides, streams and pools. In the fringes of dense evergreen bush which clothe the banks of these inland rivers the fly finds protection from the extremes of high temperatures and low humidities which prevail in the open park-like country during the six months' dry season. Such climatic conditions would rapidly prove fatal to the tsetse and to its pupæ if it had not the protection of the evergreen bush and the coolness and humidity afforded by the proximity of water. But to the people also water is essential, in fact the very existence of the inland tribes is bound up with the rivers, where they water themselves and their flocks, wash and bathe, fish and gather fruit, herbs, timber and a whole range of everyday requirements.

The inevitable contact between tsetse and man which comes about in this way gave rise not only to the spectacular outbreaks of sleeping sickness which occurred, but to a whole series of secondary evils. When the sickness became alarming, the people tried to escape it in the only way they knew, by abandoning the village and moving to a new site. But as long as the new village was built near a river, it was merely a matter of time before a new flare-up arose and the people would move on again. In this way, whole river valleys were depopulated and the surviving people were pushed back into the headwaters of side streams or on to the watersheds, which were sometimes five or six miles from the nearest water in the dry season. Overcrowding, soil erosion, diminishing crops, loss of cattle, malnutrition, and a general lowering of the standard of living and of health resulted. And as the deserted valleys filled up with wild game and the farms and villages were overgrown by bush, the tsetse was left with the rivers to itself.

It was necessary to get rid of the tsetse for a double purpose, to wipe out the disease more completely than mass treatment alone could do, and to make possible the return of the people to the river valleys in order to correct all the secondary evils arising from the upset to their agricultural and economic systems. This was a formidable problem, to eradicate one of the indigenous insects of Africa from hundreds of square miles of country. The clue lay in the tsetse's dependence on the shade and moisture provided by the dense evergreen fringes of the river banks. Research showed that, although the tsetse is widespread during the cooler and moister weather of the wet season, the flies concentrate along certain parts of the river during the hot and arid dry season. These concentrations always occurred where a specific vegetation was growing, in fact it was possible to establish that the presence of certain species of trees and shrubs always indicated the presence of the tsetse. The corollary was obvious. Get rid of these particular trees and the place would be no longer habitable for the fly. Do this throughout a whole river and there would be no dry season concentrations of tsetse left to spread out during the more clement time of the rains and be a menace to the people and their stock. This method, of 'selective clearing',

A ford and washing-place on the Black Volta, bordering the north of the Gold Coast and French Ivory Coast. The dense bush fringing the far bank is a typical habitat of the two species of tsetse fly which transmit sleeping sickness in West Africa

was applied first in 1940, to the Kamba River and its tributaries, draining an area 600 square miles in extent in the Lawra District in the north-west of the Gold Coast. The results were spectacular. The tsetse disappeared as the clearing progressed, and a year after the work was completed, that is by 1943, our teams of expert fly-boys could find less than a dozen flies in places where their catches had been numbered in thousands only three years before. As in all biological work, the last stages were slower than the first, and it took another three or four years for the last few tsetse to disappear, but disappear they did.

The effect on sleeping sickness was equally dramatic, with a ninety per cent reduction in the number of cases coming from the Kamba area by 1943, the year after the completion of work. Most important of all, the reduction was progressive, it was not merely a lowering of the incidence of the disease such as had followed mass treatment. By 1950, ten years after the start of this work, a ninety-nine and a half per cent reduction in sleeping sickness had taken place, virtual elimination of the disease in this once seriously infected area. By this time, of course, the early success had been followed up by extension of the work of selective clearing to the whole of what I shall call the 'epidemic centre' in the north-west of the Gold Coast—the area of which was nearly 3,000 square miles. Moreover, the fact that the whole area of the epidemic straddled international frontiers had not meant a lop-sided attack. From the very first an active co-operation with the French Sleeping Sickness Service had been maintained.

During exchanges of visits their entomologists had learned the technique of selective clearing, which was then applied in combination with their well-organized mass treatment with the result that they had, by 1950, virtually eliminated the disease from at least the northern half of their epidemic area.

So much for the first success, that of getting the sickness itself under such a high degree of control that it was possible to visualize its complete eradication. There remained the important practical point of maintenance, for if the low evergreen bushes were allowed to re-grow there would be the danger of a return of the tsetse with its menace to man and his stock. Yet a continual re-clearing along hundreds of miles of river bank would have soon become such a costly business as to have put a limit to the further expansion of the work, and the eradication campaign would have become bogged down.

There was also the second aspect of the problem, that arising from the displacement of the people from the river valleys onto the dry uplands and the consequent disruption of their domestic and agricultural life. There was a solution which answered nicely both these questions. If the people could be got back to their original homes along the rivers this would relieve the pressure on the uplands—the very places where population pressure is most dangerous in tropical countries—the settlers would enjoy a high living standard, and their very presence, their farming, grazing, cutting of timber, etc., would be the best safeguard against the regrowth of bush and return of the tsetse.

It was a big 'if', for the rivers had got a bad name during the years of the epidemic. We did not want to bring any pressure on the people to move, nor embark on elaborate and costly schemes of re-settlement which could not be repeated. And does not elaborate planning tend to rob the African of those

An abandoned village

Left: the Kamba River, draining 600 square miles of the Lawra district in the north of the Gold Coast, was the first to be entirely freed of tsetse by means of selective clearing. Right: crops of beans and grain are grown on the cleared banks of the River Volta

valuable qualities, initiative and responsibility? So advice was bestowed freely, with exhortations, visits, long arguments and much drinking of millet beer. A little help was given here and there—the maintenance of roads and canoe crossings, a pilot farm or two, and finally a group of compounds in a place where they were most required. But behind the advice were the solid advantages of the riverside, the land, the grazing, the timber and above all the water. And so the people came trickling back, slowly at first, and always with some cautious attempts at farming before they settled. The land proved its worth. Harvests on some of the Kamba farms were 40 per cent above the average for the district and showed earlier and heavier yields than those from the impoverished uplands to the north and south. The cattle population of the district had more than doubled by 1952, the result of the combination of better grazing and watering, freedom from the trypanosome diseases and fewer attacks from lion, leopard and hyæna which, together with other game, had dominated the valley ten years before. One of the most spectacular successes was achieved through building weirs across the river to hold up good stretches of deep water during the dry season. Three of these weirs held up ten miles of permanent water throughout the dry season, in places where there had been only interrupted pools before. Here was water enough for the people and their stock, and fresh grazing along the banks. Above all here were fish in abundance: for their rate of multiplication and growth in the tropics is phenomenal, but is checked annually by the drying of the streams to small trickles or isolated pools. Two years after the building of the first weir in 1938 the Fishery Department netted 3,250 lbs. of fish, a ton and a half, where the previous catches from the drying pools had not reached 20 lbs. A fishery school had already been established in this district, with local boys being taught the whole practice and art of fishing. And so one more activity was added to encourage the people to settle once again along their rivers, and to make the fullest use of their vital resources.

The final chapter views the picture as a whole, with history as well as geography

entering into it. An Arab historian, Ibn Khaldoun, gives a clear description of what was certainly sleeping sickness killing one of the Emperors of the Malli kingdom, on the upper Niger, in 1374, and states that the sickness was then common among those people. This early location is 500 miles north of the Guinea Forest, which was always supposed to be the original location of this disease. Subsequent history shows the surprising but unquestionable fact that sleeping sickness is a disease of the dry inland savannah country and not of the forest and coast, despite the fact that tsetse are ubiquitous in the forest in contrast to their limited riverside distribution in the savannah. To simplify greatly a very complex problem it seems that the close and repeated contact between man and tsetse in the north provides the right set of conditions for the development of serious epidemics, whereas these conditions are never fulfilled within the forest. There has been no lack of opportunity for infection to reach the forest, because one of the oldest and most flourishing of trades, that in the cola nut, has been bringing a regular stream of natives from the country of the Upper Niger and Upper Volta rivers down into the Ashanti forest since at least the middle ages. Now the places from which these traders came, and which they passed through on their treks, lie in the very areas of the most severe sleeping sickness outbreaks of twenty to over a hundred years ago. From three or four hundred to several thousand people formed a caravan; their progress was slow, with halts at rivers for watering, washing and sorting, and damping their valuable cola nuts. It is certain that such caravans would spread the disease, and spread it they did, but only within the open country of the savannah. Histories of the forest show no records of comparable epidemics arising there. Significantly enough the worst outbreaks were centred on the termini of the cola caravans in North-West Ashanti. Here then was a clue which made it possible to plan the eradication of sleeping sickness from considerable territories with a minimum of expenditure

One of the most successful developments was the introduction of fishing, not previously practised by the local inhabitants. Small boys, with hooks and line, and a minimum of instruction take an average of 100 lbs. of fish per boy a month

The fly-boys are the key men in the campaign against the tsetse fly. Using themselves as bait, they search for the tsetse in the areas being studied. They work to standard hours and methods so that their catches supply the data on the distribution, frequency, and habits of the fly which are essential for devising and checking methods of control

and work. The true epidemic foci, with high infection rates, were there in the northern zone of the savannah. Around these, and especially southwards into the forest, were secondary areas where the maintenance of much lower infection rates seemed to be dependent on a constant introduction from the true foci. If all one's forces were concentrated on the true epidemic foci, it would be possible to eradicate the tsetse, and with it sleeping sickness, from these areas and put a stop to the spread of infection into the secondary areas. These latter should, if one's reasoning were correct, clear up spontaneously, even if slowly, and without any further application of control measures. And this is what is happening. By 1951 the big epidemic on both French and British sides of the Upper Volta rivers had been got under complete control. To the south of this lay hundreds of square miles of country, full of tsetse fly. It would have been an impossible task to get rid of them, so they were left alone. Yet the amount of disease along the trade route and in North-West Ashanti was already showing a remarkable decline and one had the satisfaction of knowing that, whether the small details of the theory were correct or not, it was at least providing a workable plan.

Behind this story is the science of ecology, the study of an ever-widening circle of facts relevant to one central problem. Among an intricate complex

of factors there may be found a significant few which exert a predominating influence, that is, which afford the key to an understanding of the problem and of its solution. There are, for example, the conflict of man and fly for domination of the most valuable parts of Africa, the river valleys; an age-old system of trade spreading the epidemic across hundreds of miles of dry, open country, but failing to implant it in the forest; the dynamic nature of the problem, which starts with a killing disease and ends up with erosion and hunger. So it must be tackled with imagination and breadth of outlook, and a variety of interests and activities must be enlisted to bring about a stable solution. But the final answer will always be with the African himself, farmer, fisher, herdsman, housewife. It is to these people, often living precariously in a harsh environment, that the presence of the tsetse is a reality. They also, once the balance of factors is tipped in their favour, can become its most effective enemies.

DISCUSSION

MR. W. H. POTTS: I have been working on tsetse fly on the east side of Africa where conditions are a little different from those which Dr. Morris has described. But the particular feature of Dr. Morris's achievement which appeals to me as a fellow entomologist is that he has produced a solution to a problem of human disease which was originally treated as a medical problem, and the solution he has produced is an entomological solution—an attack on the insect which spreads the disease rather than by dealing with the disease itself.

That does lead me to one question I should like to put to Dr. Morris. He said that the control they eventually evolved was a combination of mass medical treatment and selective clearing, which meant wiping out the insect transmitter. Would it not be sufficient to cut out the mass medical treatment, and simply devote one's attention to the insects, the spreaders of the disease?

I cannot refrain from commenting on at least one difference between work on the east side of Africa and work on the west side: I was very amused with the pictures of his fly-boys, to whom he pays a very just tribute. We must pay the same tribute on the east side, but there on the west coast they seem to me to lead a gentleman's life compared with ours on the east coast, where, instead of being able to spend their days sitting on the bank of a stream catching their tsetse flies, they have to walk briskly, stopping at intervals to catch them. If they sat down they would not catch very many by the end of the day.

THE LECTURER: Yes, I actually came to an agreement with our local medical specialist on sleeping sickness that his own work was not at all essential. In fact, the medical treatment could be dispensed with altogether and one could produce just as food results; not quite so quickly, but the end effect would be just as good by concentrating on entomological control. That goes without saying. If you have got no tsetse left you are not going to get your disease spread any longer.

The point I would raise is that by co-operating in one's work with the doctors one gets that invaluable information on the distribution of the disease which is the basis on which one can plan the most effective and economical method of attack on the problem as a whole. So that, initially at least, it is as well to have the medical men co-operating with their survey teams, provided they do it properly so that they get a fairly true picture of the distribution of the disease. One then gets the complete picture and a rather more rapid result in reducing the disease as a menace. If one

were doing without the medical work, the individual cure could not occur, and the individual would suffer.

As for the fly-boys, ours sit down because we are dealing with a fly which is particularly attracted to human beings, and we have actually found we catch far more flies by offering ourselves as bait and waiting for the fly to come to us, than by running away from it, whereas the fly Mr. Potts has been working with—we also have it—is primarily the game tsetse, which prefers game and even domestic animals to humans. It likes a moving object and you do catch far more of those by keeping your fly-boys moving. I should admit that a moving boy is the best for one species of fly, and a sitting boy is the best for another. Those are just the technicalities that crop up in these problems.

DR. EDWARD HINDLE, F.R.S.: I need hardly say with what very great pleasure I have listened to this exposition of the way in which this very serious problem, one of the most serious in the economic development of Africa, has been tackled so successfully by applying entomological methods of control. I was also impressed by the interesting way in which ecological studies of the tsetse-fly have been linked up with the habits of the Africans in the neighbourhood.

With regard to the areas of restricted distribution, my old friend of very many years ago, Dr. Shircore, was, I believe, the first to call attention to the restricted distribution of tsetse flies during the dry season. I remember just before the first war, he showed that in Nyasaland *Glossina morsitans*, the species which is specially concerned in the transmission of tsetse fly disease, or nagana, was restricted to fairly limited areas in the dry season. He indicated at that time that it might be possible to control tsetse flies more easily by tackling them during the dry season when they had this restricted distribution. It is, therefore, an added interest to me to see that this method has been applied so successfully in the case of another species of tsetse fly on the west coast of Africa.

A vote of thanks to the Lecturer was proposed by the Chairman and carried with acclamation.

SIR SELWYN SELWYN-CLARKE, K.B.E., C.M.G. (Chairman, Commonwealth Committee): Before we disperse, I want to ask you to join with me in thanking our chairman for the able way in which he has conducted the proceedings this afternoon. I think the Commonwealth Section of the Society have been especially fortunate in having persuaded Professor Munro to take the Chair. Not only is he the Professor of Zoology and Applied Entomology in the University of London, but he is also the father and Director of the Biological Field Station of the Imperial College of Science and Technology.

Our lecturer is, of course, a distinguished son of that organization. In his early days he worked under Professor Munro before he became a world-wide expert in the biological control of sleeping sickness.

I should like to emphasize a point which came out in his lecture, the very great importance of this disease to Africa. In point of fact, it is claimed that at least a quarter of the vast African continent has been hampered in its development by the presence of this disease. It is probably within the knowledge of many of us, too, that it afflicted Uganda in the early part of this century, killing two-thirds of the inhabitants living near the Lake Victoria.

I should like to add my tribute for the excellent lecture we have listened to, and I now formally move a hearty vote of thanks to Professor Munro for taking the Chair.

The vote of thanks was carried with acclamation and the meeting then ended.

THE CONTEMPORARY ROLE OF INDUSTRIAL STANDARDS

A paper by

H. A. R. BINNEY, C.B.,

Director and Secretary, British Standards Institution,

read to the Society on Wednesday, 18th March, 1953

with Sir Graham Cunningham, K.B.E., Chairman,

Shipbuilding Advisory Committee, in the Chair

THE CHAIRMAN: The paper that Mr. Binney is going to read deals with standardization, and standardization has many and diverse applications. The standardization of the quality of a raw material is something totally and utterly different from standardization of, let us say, the cubic content of a milk bottle or a screw thread. I remember one thing very distinctly in relation to screw threads, a small thing, but at the time of major importance. I was an Air Raid Warden early on in the blitz in London, and I remember we had a mine that exploded and set light to some buildings nearby. The fire engine came along but the pipe line did not have the right kind of screw thread to fit the hose end, and they had to go away in a taxi and get an adapter to make the pipe line from the fire engine fit the hole in the road. I thought: 'That is just a simple matter of standardization'. It was tackled very shortly afterwards, of course, but originally if a fire engine came from Holborn Viaduct into the district of Paddington it had to have a different form of hose connection. There was a very simple case of the need for standardization. It was not entirely a question of standardization of thread, but also of size, but you can have both.

The other matter in relation to screw threads with which I had some connection arose when I was in the Ministry of Supply and had the privilege—and I regarded it as a very great privilege—of sending off with good wishes the very first committee that visited America in an attempt to standardize screw threads between the Americans and us. I believe that this might be one of the greatest international standardizations which could ever be effected. Incidentally, to do it as just one overall measure would I believe cost both countries millions of pounds sterling. One hardly realizes the cost of a job of that kind until one has to approach the problem.

Mr. Binney, whom I have had the privilege of knowing for many years, was Under Secretary at the Board of Trade when I first knew him, and he was very wisely selected by the British Standards Institution to become its Secretary and Director. He is here to-day to tell you about the job for which he is responsible, and in which he is *par excellence* an expert.

The following paper was then read:

THE PAPER

The title originally suggested for this paper was 'Fifty Years' Work on Industrial Standards,' and the Institution of which I am the Chief Executive did indeed celebrate its jubilee just two years ago. That jubilee took us back to 1901 and to the formation of the original Engineering Standards Committee—and 'original' is in this context very much the right word. For that Committee not only pioneered the idea of voluntary standards, but also laid

down the principles which have since served as a model for many of the thirty odd national standards bodies now existing throughout the industrial world.

Some of the early achievements of the Engineering Standards Committee were impressive. One of its first successes was to reduce the number of varieties of tramway rails from 75 to 5, without any loss of efficiency at the users' end, and with an estimated saving in production costs of £1 million a year. In the language of to-day, the Committee showed how 'greater productivity at lower cost' could be brought about by means of standards mutually agreed between producers, distributors and users.

By the end of the first war, the concept had won such wide acceptance that the Committee was reconstituted in 1918 as the British Engineering Standards Association; while by 1931 so many other industries were seeing the need for voluntary standards that the British Standards Institution as such was created.

I do not intend, however, to give you a detailed historical review. As a comparative newcomer to the B.S.I.—I arrived just in time to participate in its Jubilee—I feel it would be much more appropriate for me to try to give you to-day's picture of standards work and of its impact on the national economy and to describe the main trends as I see them. The significant developments of recent years provide another and perhaps overriding reason why I should try to deal largely with contemporary affairs.

I shall assume that on some aspects of the subject we meet on common ground. Before this audience I need hardly spend time in combating the myth that 'standardization' (that much misused word) leads to uniformity and mediocrity and applies a brake to enterprise and invention. It is surely self-evident that applied standards have played an enormous part in that improvement of living standards and comfort which modern industrialized communities enjoy over those of earlier times.

On the other hand, I shall not ask you to take it for granted that the development and application of industrial standards is necessarily a good thing in every case. That they can be shown to be so over wide areas of technology and production is certainly true; but in directing the present rapid expansion of the B.S.I.'s work, I hold firmly to the view that the timing must be right and that the need must be proved in each individual case.

First let me establish a point which is well understood in many spheres, but appears to be only vaguely comprehended by a few branches of industry and trade which have recently come into contact with the B.S.I.—this is that the B.S.I. is primarily a co-ordinating body. Our job is to provide an independent forum within which those who want industrial standards, and equally any who do not want them, can come and hammer out their arguments in the presence of adequate representation of all the industrial, professional and commercial circles who may be affected by the final decision—whichever way it goes.

That is not to say that our service is limited to the provision of a room and a table round which the protagonists can sit—though, to be sure, there are times when getting even that much accepted might be no minor achievement. What we provide is an adequate technological appreciation of the problems involved, a

practical service of fact-finding in relation to those problems and, above all, a great wealth of experience in negotiation and in the art of informed compromise.

B.S.I. officials may not and will not adopt partisan roles. Our job is to hold the ring, to see that everybody gets a fair shout and a fair hearing. At the same time we are intent on seeing that business is conducted with due celerity, that decisions are reached with the minimum expenditure of time and that, as far as we can help towards it, the decisions are the best. Standards do not come just from putting everybody's ideas into a pot, shaking it around and coming up with an average.

What is the present pattern of standards work? A very large part still concerns the basic materials of production and construction. Through the combined efforts of producers and users of these materials, precise and well-tried specifications for many hundreds of raw and processed materials, used in thousands of factories and constructional projects, have been embodied in British Standards.

I could quote scores of examples, but let me take only one. A buyer of processed steel, whether he wants it for building a railway bridge, a bicycle frame or a television set, or for any of a thousand other common purposes, can turn to a British Standard; there he will find a clear and exact specification for the properties of steel section, tube or sheet which will most economically and satisfactorily perform the function required.

And it is not merely true that the buyer can enlist this safeguard. It is a reliable estimate that not less than 95 per cent of the steel produced in this country is made and sold in accordance with British Standards. The precise documentation of stresses, load capacities, machining conditions and other essential technical facts so given is of great help to designers, manufacturers and executives, and it clearly represents an enormous saving of time and cost at the most valuable creative levels of work.

And here I should note the important spur to competition provided, and the freedom from restrictive attitudes evidenced, by a recognized and open, published specification. Authoritative and open standards are the very essence of competition.

All this can be said of a vast range of materials, and for these it is perhaps interesting to record that much recent work in the revision of specifications undertaken to meet the stress of shortages of material is proving valid now that there is an improvement, even if only a temporary one, in the supply position of those materials.

From materials the work branches out into components, and often complete equipment, made by and used in the different industries of the country. The emphasis in particular cases can vary: dimensional features to secure interchangeability of parts; construction and performance factors concerned with safety (as in acceptance tests for boilers, construction features of cranes and other lifting tackle, signalling apparatus, safety glass and so on); the settlement of performance ratings (for example, for agricultural tractors) to assist purchasers and sellers; and even the standardization of parts and of markings for blood transfusion equipment and anæsthetists' apparatus.

To mention one of the most common-sense instances of latter-day standards, I have been interested in a recent effort by the chemical industry and their customers to reduce to simple and usable words the polysyllabic and often unpronounceable technical terms used to define the chemical compounds employed in pest control. In the new shorthand language that has been devised 'ferric dimethyldithiocarbamate' becomes simply 'Ferbam', which seems much more suitable for market gardeners and farmers, to say nothing of ordinary mortals like myself.

The field of B.S.I. work is as wide as that of British industry itself. As a rough comparison it is right to say that about 60 per cent of it is directed to the engineering and metals trades, about 30 per cent to chemicals and building together, and the remaining ten per cent to textiles and other industries and trades. Some indication of its impact on British industry and trade can be gauged from the fact that the sales of British Standard Specifications are now approaching the rate of one million a year.

What are the directions in which this work is of special significance to-day? I think this might profitably be viewed, even if only briefly, under three main headings: first, productivity and exports; second, defence; and third, consumer goods and guarantees of quality for the man or woman in the street. The first two are vital to our whole future; the third is in a different category and while, in my view, it has sometimes been given undue prominence, it still has, within proper limits, its importance and interest.

STANDARDS AND PRODUCTIVITY

Much of what I have said so far shows that the value of industrial standards as a direct aid to efficient production is—indeed, has long been—widely accepted in British industry.

But this is still very far from saying that all that could be done in this direction has in fact been done. Furthermore, the present economic situation of this country and Western Europe has accentuated the need to increase productivity by all and every means. Everyone is familiar with the studies of American industries which have been made in recent years. Whatever we may individually think of these studies, and of the applicability of American methods in this country—and I for one believe that we must adapt them to our needs rather than adopt them wholesale—it is at any rate significant that nearly all the productivity reports on a score or more of different industries recommend the more extensive use of standardization techniques in this country as a prime source of cost economy and hence of manufacturing efficiency and competitive power. There can, indeed, be little argument in these days against the proposition that the 'three S's'—standardization, simplification and specialization—together provide one of the readiest means of achieving that all-round increase in output per man- and machine-hour which alone will preserve our export levels and improve our national standards of living.

One of the Anglo-American Productivity Council Reports dealt specifically with the use and effect of standardization techniques in American industry, and

its main conclusion was graphically summarized by that outstanding anglophile Mr. William L. Batt, whom many will remember for his work as vice-chairman of the wartime Combined Production and Resources Board of Britain, Canada and the United States and more recently as the London representative of the United States Mutual Security Agency and the NATO Defence Production Board. This is what Mr. Batt had to say:

> No one who reads this report can fail to realize all over again that lack of standardization of products and material specifications is responsible for much of Europe's low level of output per worker. Here is the main reason why a European worker must spend a month's wages to buy a bicycle which an American worker can buy with two or three days' pay.

To my mind the most significant feature of American techniques is that they are based on a general understanding and acceptance of sensible standardization as part of what may be called their 'cost-conscious psychology'. American business men, on their own record and usage, want the best possible ratio between price and quality; they expect a manufacturer to snatch every advantage from standardization of parts, and simplification of ranges, to achieve the best ratio. To compete in the United States, therefore, and with the United States, there is a need to acquire something of this habit of mind. The kind of advantages which can accrue will be familiar to you: economy of raw materials (a vital factor in this country's economic situation), simpler and more effective quality control, easier replacement and maintenance, reduction of stores lists, simplification of correspondence and quotation, and economy of design work.

This last economy is worth special attention. By specifying standard parts and fittings the time of designers, draughtsmen and other creative personnel, who represent one of our most scarce and valuable assets, can be saved for better purposes.

As an illustration of this last statement I quote the case of a very prominent firm who manufacture certain types of industrial electrical equipment. This firm told us recently that, although they already employ more than two hundred draughtsmen, they would need at least fifty more, but for the fact that so many components to standard specifications can be used. It is much easier and quicker to draw in a block and mark it 'Circuit-breaker type so-and-so, to British Standard No. so-and-so' than it is to devise and draw the complete component. The subsequent buying and installation operations are equally simplified; and this one example can be multiplied a thousand times every day.

Not that I would claim that standardization offers a panacea for every productivity problem. But I do assert that its benefits to a country faced with our output problem are of crucial importance; and I repeat that they are a long way yet from being fully realized.

STANDARDS AND EXPORT TRADE

Nor can we, in my view, afford to write off the argument for the further use of standards on grounds of the need for flexibility, of avoidance of rigidity in the

interests of further research, or of the specialized demands of certain export customers, valid as these considerations may be in particular cases.

I would like to quote here from a recent and authoritative paper presented to the Institution of Electrical Engineers. This paper made it very clear that the electrical industry fully endorses the principle of creating standards, and went on to say:

> In 1938 the electrical manufacturing industry [of this country] became the largest exporter of electrical goods in the world, and ten years later, in 1948, it had doubled the quantity exported in 1938. That result could not have been achieved without the standardization already effected, but much more will be possible with still more standardization.

It is frequently found that a guarantee of conformity to an established British Standard is all that the overseas buyer needs by way of assurance that the material or commodity concerned will meet his requirements. In other words, British Standards are part of the regular language of commerce and often the precise terms of contract.

But as in recent years the importance of standards to our overseas trade has grown, so has the tendency for individual nations to develop standards of their own. There are obvious dangers, as well as advantages, in the large-scale development of national standards by many countries, unless there is close co-operation in that development.

In earlier times, when the United Kingdom had a clear lead in engineering exports, standard British materials and components were widely accepted abroad —even despite the use of the metric system in Continental countries. In those days a British manufacturer could be content to seek export markets with his standard domestic products. But this convenient state of affairs changed with rising competition from other countries, and especially with the increasing need, as technology advanced, for accuracy of definition.

It has now become essential to our survival that standards set up in other countries should not constitute, as they could so easily do, a barrier to our exports as formidable as a new tariff, or a policy of import restrictions. For these reasons there has in recent years been a marked increase in the activity of the B.S.I. at the international standards level. The work is pursued in the broad interests of securing, where we can, that British Standards are used to the maximum extent possible overseas and, secondly, or alternatively, that overseas standards, so far as we are able to ensure this, are suited to British practice and techniques.

Active participation by the B.S.I. in the work of the International Organization for Standardization (more easily known as ISO), of the International Electrotechnical Commission and in related work under the ægis of O.E.E.C. contributes to these objectives, as well as to the more general ones of expanding international trade by promoting the interchangeability of goods, equipment and machinery, the speeding up of transport through standard handling apparatus and the like. A useful example of work in this last field was the recent agreement on standard sizes and specifications for 'pallets'—for the movement of goods

by fork-lift truck and other means. It has been estimated by one of our biggest overseas trading concerns that with older methods of transit and shipment a given load may have to be broken down and reassembled no fewer than twenty times between an inland factory in this country and an inland customer in Italy. But that same load, if mounted on one of the standard international pallets could pass from a despatch department here, and thence by road, rail and sea transport right to its ultimate destination—without being broken down a single time on the whole journey. Under these ideal conditions the savings in time and cost, and the reduction in the risk of loss or damage, are too obvious to need stressing.

I should have mentioned before, but it would then have broken the thread of my story, that we maintain especially close collaboration with the other Commonwealth countries in order to ensure that their standards and ours are as closely related as possible. All our draft standards are exchanged for comment among the Commonwealth countries and many of the standards adopted by our friends in Australia, New Zealand, South Africa, India and Pakistan are either identical in technical content or are very largely based upon the relevant British Standard. Commonwealth representatives meet together at frequent intervals to ensure a close alignment of outlook and policy as between themselves and in relation to foreign countries. Canada has particular problems of her own and inevitably her national standards are more closely related to American than to British practice, but she maintains the closest and friendliest contact with us and is an enthusiastic supporter of all efforts to promote American–British–Canadian agreement.

A particularly interesting example of Canada's collaboration is seen in the scheme introduced three years ago and now running very successfully whereby British electrical equipment destined for Canada can be 'approved' before it leaves these shores. This is a case where safety and other requirements in connection with electrical apparatus and equipment have to comply with Canadian laws which call for departures from normal British practice. The B.S.I. therefore acts as the agent in London of the Canadian Standards Association and provides on-the-spot facilities for the testing and inspection of equipment to ensure that it conforms to Canadian requirements and will thus be accepted by the Canadian customer. This service helps a trade which, in the case of machine tools alone is valued at 11 million dollars a year. It is an important service, and one which might ultimately have wider application in relation to other goods and other countries where compulsory standards are laid down.

I have dwelt at some length on these international aspects because of their extreme importance to this country and also because of the new impetus and emphasis which internat.onal work has taken on since the war.

STANDARDS IN DEFENCE

I turn now to the subject of defence, and in particular the contribution which standardization can make to the co-ordinated activities of Britain, the United States, Canada and the other NATO powers. The almost complete absence of basic common standards for language, weapons, equipment,

training and procedure is a serious handicap affecting the entire Atlantic Defence Community, and much thought is being devoted to a solution of this problem.

It has been reliably stated that the lack of engineering standards between Britain, the Commonwealth countries and America delayed the building up of our strength and consequently prolonged the late war by at least twelve months. I can well believe it. Lack of uniformity in screw threads alone is said to have cost the Allies a thousand million dollars, and when the Rolls Royce Merlin engine was to be produced in America six vital months were lost while drawings were being translated into American practice. Many other equally startling examples have been given from time to time by responsible spokesmen.

Since the war strenuous efforts have been made to put some of these things right. A system of unified screw threads has been agreed and standards published in America, Britain and Canada (the 'A.B.C.' countries as they are called). This major achievement has been followed up by discussions on other aspects of basic engineering practice. In recent months we have gone a long way towards agreeing the basis of a common system of Limits and Fits, and before the year is out we may be able to record a similar achievement in that most difficult of all subjects, engineering drawing practice.

Speaking of this last subject I must crave your indulgence if I quote Mr. William L. Batt once more. Addressing recently an influential gathering in New York he said:

> The standardization of engineering drawing practice in America, Britain and Canada is probably the most important single step these three democracies could take to make better use of their combined resources . . . . There is no commercial advantage to be gained by a country in protecting its drawing practice.

Discussions are also proceeding among the 'A.B.C.' countries concerning particular types of screw-threads not covered by the present agreement. Later it is hoped to tackle some of the other fundamental engineering practices, and the importance of agreement in this field needs no more emphasis from me. Clearly there are wide opportunities for fruitful co-operation between the 'A.B.C.' countries and among the others of the free world—co-operation which though it starts from the point of view of defence, can have very much wider economic significance.

Similar work is proceeding in the service of the humanities. A programme has recently been started for the standardization of medical equipment among NATO countries. When it is finished, a British stretcher will fit the trolleys of an American ambulance and, say, a Turkish needle will fit a French syringe. Last year we entertained in the B.S.I. Council Room a twelve-nation conference, organized by ISO, to seek the standardization of blood transfusion equipment. Good progress was made, and it is hoped finally to achieve a sufficient degree of interchangeability to ensure that the use of this life-saving technique will no longer be handicapped by differences in the equipment made in different countries.

Before leaving this wide subject of international standards co-operation I

should perhaps remind you that there is also the problem of keeping in line the technical writing and speaking practices of the English-speaking countries. When I have attended international conferences, my delegation has often been tempted to ask for papers by the United States delegation to be translated into English, and I dare say they have felt the same about ours. There are plenty of jokes going round about trans-Atlantic misunderstandings. For example when we 'table' a document we confidently hope that it will receive some consideration by interested parties. But in America to table a document means to put it away. It is obviously a much more serious matter if technical terms in industry become substantially out of line and in the B.S.I. we are giving this problem the attention it deserves. We have agreed with our colleagues in the American Standards Association to work closely together so that where existing terms differ we can harmonize them as far as possible, and at the same time try to ensure that we keep in step in the development of new technical terms. As is well-known, many British Standards include the definition of terms used in connection with the subject matter, and these definitions will be one of the first things we look at again in our efforts to 'standardize' Anglo-American terminology.

STANDARDS AND THE CONSUMER

The technique of evolving voluntarily and mutually agreed standards to suit alike the buyer and seller of goods or services has developed, and continues to develop, wherever knowledgeable seller is in contact with knowledgeable buyer —as, for example, in the sale of semi-manufactured materials to a producer of finished goods. At this level *caveat emptor* has long lost its sinister significance. When, however, the finished goods reach the consumer—the housewife or the typist buying linen or underwear, the business man buying his socks or painting the bathroom—does this still remain true? This is a matter which has occupied considerable space in the press and in Parliamentary reports during the past year and there can be no argument that we all have to buy a very wide variety of commodities, of which we are unable to assess the quality or value.

It is for this reason that the B.S.I. was invited by the Government to collaborate with the industries producing goods formerly covered by the Utility scheme in the preparation of quality standards for the same classes of goods. This project is by no means a simple matter of taking over Utility specifications lock, stock and barrel and writing them up as British Standards. The Utility specifications had, according to general view, become out-moded. They could satisfactorily be replaced only by much more flexibly drawn standards of quality. To accomplish this, in some very difficult fields, needs patience as well as ingenuity. Much effort has been expended, but results in a good many cases are still awaited.

The B.S.I. system of certification marking whereby one of our registered trade marks, notably what is popularly called the 'Kite' mark, may be applied to goods complying with British Standards, has been in operation for many years for the benefit of producers and users of many types of capital goods and what are called 'durable consumer' goods. Until recently, however, it applied to a

very small number of the goods purchased by the ordinary shopper. But with the development of standards in the field formerly occupied by Utility, there came the realization of a demand by the general public for some independent assurance that, where they lacked the knowledge or ability to judge for themselves, the goods were in fact up to the standard.

The first of these new 'independent quality' marking schemes was launched some months ago and is working well. It applies to bedding, where so much that may affect quality and hygiene is necessarily out of sight. The public can now be satisfied that mattresses and the like bearing the 'Kite' mark are quality goods. In a few weeks—on May 1st to be exact—the first 'Kite'-marked furniture will start to flow to the shops.

There is, of course, a considerable range of commodities where established brands of deservedly high repute give all the assurance needed. The discriminating buyer also knows the reputation of particular shops. But not all goods by a long way are branded; not all branded products are necessarily good; and many branded goods tend to be too costly for a large section of the population. There appears to be a genuine need, there certainly is a vocal demand, for an independent 'brand' such as the 'Kite' mark can provide.

The recent controversy on the subject of quality standards for textile goods must have been noticed by many people. In discussing this 'post-Utility' responsibility which my Institution was asked to assume, I have used—deliberately—the words 'voluntary' and 'mutually agreed.' They and all that they connote lie at the very root of the matter—though they have been ignored or conveniently forgotten by some of the protagonists in the recent argument. No industry is compelled to adopt quality standards or a marking scheme; no individual producer in an industry which decides to support that policy need regard himself as bound by it. On the standards front this is still a free country; all I would add is, 'Why not let the consumer decide?'

The standards for 'Kite'-marked furniture to which I referred earlier have a special interest and may well be the forerunner of a new class of standard for consumer goods. There were some difficult problems; not least the perennial problem of assessing just where to draw the line between what is adequate quality and what is not, and how to draw that line. In an industry like the furniture industry, any serious limitation on the freedom of designers would be most unwelcome both to manufacturers and to the public, and the line is therefore to be drawn by a series of performance tests. The principle is that of applying to articles of furniture measured stresses and strains which simulate actual conditions of use in the home. It is a new technique in this or any other country, and will doubtless have to be refined as experience is gained, but I can say that some of the industry's best practical men who were sceptical of these performance tests at first have been converted to strongest support.

With the advent of many more demands for standards affecting consumer and household goods, it was decided that we must have available some direct and reliable expression of consumer opinion, as presented by the women of the country, not in a search for that elusive and illusory 'woman's point of view' but

simply because the overwhelming bulk of consumer buying is done by women. So our Women's Advisory Committee was set up, and—speaking with some experience in these matters—I believe that it is quite unique as a consultative group. Through its representatives we reckon to have direct access to the views and ideas of well over two million women spread all over the country. I am not sure whether it is true that two million women cannot be wrong, but I do know that great deference is paid to their views by the technicians and business leaders who work through the British Standards Institution for the creation of sound industrial standards.

I hope that I shall have succeeded in giving you some broad impression of what is going on to-day in the arena of industrial standards work. I am very conscious that the reputation of the B.S.I., both here and in other countries, rests on the integrity and far-sightedness of those many industries which have provided the driving force and expertise of the B.S.I. This, indeed, is the prime source of the confidence which is now widely placed in us by industry and by Government. Our task to-day is bringing us more into the public eye, and the aim will continue to be to help industry to function at its highest possible level of efficiency and the greater good of the community as a whole.

DISCUSSION

THE CHAIRMAN: Nobody who has an interest in this subject—and everyone in this country ought to have an interest in it—can have failed to appreciate the most instructive address which Mr. Binney has given us. He showed the immensely wide field covered by the British Standards Institution.

I think there are some points which we could criticize in the B.S.I., but there are some things of which I think the British public are not adequately aware and which should be brought to their notice. The coverage of interests in the committees which form standards is quite extraordinary. If it is a manufactured article which is the subject of a standard, it is not merely the manufacturer from the particular trade who is consulted, but everybody surrounding it. The user, government departments if it has a bearing on defence or other programmes, and all interested parties sit together to formulate the standards which eventually become accepted, and they have the expert advice of an official of the B.S.I. My experience is—and I have been Chairman of a Committee of that kind—that when the draft specification is prepared it is sent to everybody who might have an interest in the publication of that specification, both in this country and in Commonwealth countries. It is sent round to them for their comments, and all those comments come back and are considered before the standard specification is accepted. So you see there is immense trouble taken on the smallest detail of all these specifications, and the work is voluminous.

On the 'Kite' mark, my criticism is that I do not think the B.S.I. publicizes its importance nearly enough. One of my companies uses it on its products, and the customers complain, 'What the dickens is this here for as well as your trade mark? It's an eyesore, please take it off'. We had that complaint, let us face up to it, and I think that complaint arose because the B.S.I. is not sufficiently publicizing the importance of that 'Kite' mark so that the public ensures that it appears on an article before they buy it. I believe that the B.S.I. could do a great deal more on that, although I know it is difficult for them to go advertising themselves; but they must do that in order to put the 'Kite' mark across to the British public as a whole, so that when they go shopping they will ensure that it is on any article they buy.

But there is something far more important and far wider that Mr. Binney touched on, that is the international field. I had some connection with the Dollar Exports Board when it was formed, and I went to Canada and America, and all over this country talking to a number of industrialists. When I pointed out that if they wanted to sell equipment which had an independent drive to Canada or America to bring dollars to this country they would have to have wiring and voltage which would be acceptable in those countries and not merely what was used in this country, I have had manufacturers answer me, 'If they won't take what I put on it, let them put their own on'. That is not a bit of good. We will not sell our goods with that mental approach, and if we do not sell our goods in these foreign countries we shall not survive. That is the position of this country to-day. That is why this international standardization is immensely important to us, and where there are no international standards we must take note of existing standards and practices in foreign countries if we are going to sell our goods there.

MR. A. B. BUCKLEY, O.B.E., F.C.G.I., M.I.C.E.: I speak as a non-industrialist, and I am a little anxious about the fact that industry is responsible for policy and control. Therefore, I ask the lecturer if he could give us some figures to give us a sort of general background of the representation which industry has in the Institution and if he could tell us whether all industry is represented, or just a part. How much does the Government contribute, and how many firms and organizations contribute annually more than two guineas, or contribute a donation? That ought to give an average figure for the representation of industry on the Institution.

THE LECTURER: May I first of all try to deal briefly, in the time available, with some of the points about which the chairman inquired.

As for the 'Kite' mark, and the publicity of the B.S.I., I should most heartily agree with him. Much more publicity for the 'Kite' mark is necessary, perhaps even essential. We are not in the least concerned to hide our light under a bushel any more. What we are concerned about is the enormous expense which can be involved in this kind of thing. A great deal of incidental publicity for the 'Kite' mark is coming nowadays from a variety of sources, and I think that is of extreme value to the industries who are joining in the scheme. But financial difficulties are the limiting factor so far as we are concerned. We have certain other views about that in relation to industrial co-operation, perhaps government co-operation; but that, at any rate, is the limiting factor.

I could not agree more heartily with what you have said concerning foreign standards, and the absolute inevitability that people must either be ready to make a truly international standard with which they have agreed, or they must adjust their product and output to the particular national standard concerned. As you know, we do keep a very full library, complete and up to date, of all foreign standards publications.

To turn to the question from Mr. Buckley: in the year ending 1st April, 1952, the amount of the Government's contribution was £90,000; the amount contributed by subscribers at two guineas was £1,621 from 772 such subscribers; the amount contributed by the companies, firms and other subscribers giving more than the then minimum two guineas was £93,405 from 7,254 organizations, firms and individuals concerned. I have not added those figures up because they would not give a true figure for the total income of the B.S.I. There are several other sources of income: licence fees, fees for the Canadian Standards Approval Scheme and, above all, sales of publications which are now running at the rate of £90,000 a year.

On the point of greater principle which Mr. Buckley raised, may I say that it is an obligation on the B.S.I., a quite plain, unequivocal obligation, to see that all substantial interests of trade and industry and the consumer—and the Government

where necessary—are represented in our councils. There is no exception to that. Each project for a standard is worked out by a committee which is fully representative of all the interests concerned. Those various committees at those lower levels are themselves responsible in a democratic way for electing committees in the general hierarchy and committee structure of the B.S.I., so that on a General Council of a total membership of about seventy, I think some forty-two are elected at each annual general meeting on nominations received from lower level committees, and others are provided by nominations set down in the bye-laws which are related to the representation of the founder institutions, certain government departments and certain organizations of a general kind in this country like the F.B.I., the Trades Union Congress, the Association of British Chambers of Commerce, and so on.

The point I would like to make is that there is a prime obligation upon the B.S.I. to see that all substantial interests are represented in any standards project.

THE CHAIRMAN: Are nationalized industries represented in those industries which subscribe to B.S.I.?

THE LECTURER: Yes, they are represented in that total of £93,450.

MR. E. G. BRISCH, M.I.MECH.E.: I speak as a consulting standardization engineer, with a vested interest in the problem. I should like, in the first place, to say how much we do appreciate the work of the B.S.I. The trouble is they suffer from two very important handicaps: one is the fact that they are a legislative and not an administrative body. The second is that terminology is against them. Nothing much has been done to explain the difference between the uniformity, simplification and standardization. The fundamental difference is known but it ought to be stressed much more than it is. Standardization is really a means of producing a greater variety of products from a smaller variety of components, by a smaller variety of materials and tools. Productivity itself is deeply affected by this, because productivity is not only the ratio between the input of time, matter and energy, and the output of goods, but also the relation of the input and output to varieties.

What can be done to put the idea across, to stress the difference between uniformity and standardization? It is my firm belief that in the engineering industry alone we could save eight million man-hours of skilled labour a month if unnecessary varieties were eliminated.

THE LECTURER: I am not too certain about Mr. Brisch's first question; I think it had to do with our legislative position. Could I make it clear anyhow that we in the B.S.I. do believe in voluntary standards? We are not tied to any government department's apron-strings. We are set up to treat all the requirements of government, industry, trade and consumer quite impartially, and we hope we may stay that way.

As for promoting the knowledge that standardization does not necessarily and properly involve mediocrity and uniformity, that depends upon all of us here, and upon all the representatives of industry and trade. Much is done, I believe, through the B.S.I. with its very large membership of nearly eight thousand firms—including perhaps fourteen or fifteen thousand members of committees—all of whom believe in the work which is going forward. It is in that way that I think we shall best indoctrinate the general public.

Of course, we ourselves do very much to-day also in relation to lectures in technical institutes, colleges, universities and so on and, given more money, we should have much more and better publicity. Gradually we shall work up to the situation where our public relations services will be more effective than they are at the present time.

MISS GLUCK: As the Royal Society of Arts is concerned with the arts as well as manufactures and sciences, I should like to ask a question about something that has

rather worried me. Whenever I talk about protection for the artist, the creator of any kind, with regard to his materials, I am told that standards means minimum standards. The manufacturers maintain that their products are wonderful and that the adoption of standards would lead to the artist not getting anything as good as he gets now.

THE LECTURER: I should say first that good standards involve a good level of quality, not necessarily an absolute minimum level of quality. That is shown by the standard specifications throughout a vast range of raw materials used in this country. I do not know what is the present viewpoint of manufacturers of artists' materials on the point which the speaker raised, but I do know that we project a meeting very shortly with them and with representatives of artists' interests to see what might be the right thing now and for the immediate future in that field of production.

MR. H. J. HUDSON: What powers has the B.S.I. to protect the use of its markings? The use of standards and the formulation of them require a very high degree of moral integrity on the part of the producer, and the B.S.I., it appears to me in the present state of my knowledge, seems to be quite without defence against the improper use of such markings.

THE LECTURER: Over the great bulk of our standards work we feel that the right thing is to leave the supervision to the contract between a knowledgeable seller and a knowledgeable buyer of goods to an agreed specification; we should be setting up far too large a central administration, and we should be cutting across the right interchanges between *entrepreneurs* in industry and trade if we decided to do otherwise. But when we get to the position at which the ordinary man or woman in the street seeks to be protected by a particular mark, for example the 'Kite' mark, then we have sometimes to step in and act on their behalf and on behalf of other manufacturers utilizing the mark who are behaving quite correctly in relation to the rules.

Our mark, the 'Kite' mark, and also the term British Standards, are protected under the Trade Marks Act. Those designations are registered in the appropriate classes with the Registrar of Trade Marks, and if a situation arises in which those marks are incorrectly applied to goods not of the requisite standard quality, then we should take appropriate action. That action need not necessarily be attack in the courts; it can, and might easily be by the normal administrative means of withdrawing a licence from a person who has a licence to mark goods with the 'Kite' mark, or by certain other steps of that character.

MR. VIVIAN DAVIES, A.M.I.MECH.E., F.INST.F.: I should like to ask Mr. Binney if it would not be worth trying to obtain a special government grant to launch the 'Kite' mark and so take advantage of the novelty attaching to this development, because I presume that now is the time to publicize it. Later on, when the scheme gets better known, there will be sufficient money being received from fees to support a certain amount of prestige advertising.

The other question I should like to ask is this: the main criticism of the work of the B.S.I. is the length of time it takes for a standard to be produced from the time it is initiated. What are the B.S.I. doing to try to cut that down? I know it is difficult, as so many interests have to be consulted.

THE LECTURER: On the first question, I am sure the questioner would know what my control. Therefore, I ask the lecturer if he could give us some figures to give us a sort natural inclinations would be about finance, but at the present moment I think I should plead, like the Chancellor, that I cannot anticipate any future action on this.

On the second issue, I do not carry in my head the latest analysis, but it is certainly true that over the last three or four years there has been a very substantial fall in the time taken to produce a standard specification. Whereas in the year before last we produced 194 new and revised standards in the course of the year apart from many amendments to existing standards, last year, the year ending 1st April, 1952, we

produced 227, and the year which will end at the end of this month will show a figure of not less than 260. I think that in itself is evidence of the greater speed with which things are being tackled now.

MR. C. GREEN: May I ask the lecturer if he can tell us whether the B.S.I. are concentrating at all on any tie-up between government specifications such as DTD, DCD, and so on, and B.S.I. specifications? There is a lot of confusion between those specifications, and it would be nice if they could all be tied in under one heading.

THE LECTURER: I cannot answer the particular question about DTD and DCD specifications, but there is a very close liaison between government standardization departments and B.S.I. We have our representatives on all the major standardization committees in Whitehall. A good deal of the work which was done solely within Whitehall is now, in fact, being done in the B.S.I. itself, partly on behalf of the Service authorities. Certainly both we, and I feel certain the Services, are sold on the desirability of standards work being adjusted to actual industrial equipment before the Services' standards are conceived and not afterwards; so that there is a true potential for rapid increase in the output of Services' requirements. Much time and thought have been devoted to that. It is a very complex problem, of course, because there are so many streams of standards work in the Services' requirements.

MR. ERIC ELLIOTT: Perhaps I could try to help the speaker in reply to that last question. The DTD specifications are generally taken to be temporary in nature and for goods which are not yet sufficiently established to merit a B.S.I. specification. In the case of metals, DTD specifications are replaced by British Standard Aircraft specifications when manufacturers and users are satisfied that such a step is warranted.

I should also like to ask a question. All the discussion up to now has been about standards for goods and materials. I should like to ask the speaker whether he feels that the time has come for the B.S.I. to turn its attention to the preparation of standard codes of practice. In the past such codes have been prepared by the Ministry of Works and published by the B.S.I., and similar work has been done by learned and professional institutions. Does not the speaker think that the B.S.I. itself should do more in this direction?

THE LECTURER: On the question just put, there has been quite close co-operation recently with the Ministry of Works Codes of Practice Council, and the main professional institutions, concerning a probable shift in the codes of practice work in the direction in which the questioner has indicated is desirable.

THE CHAIRMAN: The time has now come to end. I think the questions have helped to contribute a lot to the paper, but, of course, our thanks here to-day are really for Mr. Binney, because the preparation of a paper such as he has delivered to us is really quite an immense work for an extraordinarily busy man. Not only has he presented that paper, but he has answered all your questions clearly, so might I ask you to show your appreciation for him by the measure of your applause.

The vote of thanks was carried with acclamation.

SIR H. SAUNDERS, B.SC.(ENG.), F.C.G.I. (A Vice-President of the Society): The Society is very fortunate not only in its lecturers but also in having the help of so many men outstanding in their own particular lines who are willing to come here and take the Chair. Sir Graham is well known, of course, as an industrialist. If I may say so, he is able, forceful and humane, and he has given a good deal of his services to the Government both during the war and since. I am sure you would like to thank him, and I formally move a vote of thanks.

The vote of thanks was carried with acclamation and the meeting then ended.

GENERAL NOTES

CARPET FORTNIGHT

The British Carpets Promotion Council which has recently been set up by the Federation of British Carpet Manufacturers and the International Wool Secretariat is organizing an intensive carpet promotion campaign in the United Kingdom during 'Carpet Fortnight' which will last from September 26th to October 10th.

During this period the trade periodical *Carpet Review* is holding a window display competition to encourage a higher standard in carpet display. The competition is open to all those occupied in display work during Carpet Fortnight and entrants will be divided into two groups, the first for stores and shops employing full-time or professional display staff, and the second for all other shops and stores. In each group a first prize of fifty guineas, a second prize of twenty-five guineas, and a third prize of ten guineas will be offered, as well as a number of smaller awards. A Challenge Trophy will be given to the display man or retailer who, in the opinion of the judges, taking into account the size of shop and facilities available, has created the best display.

The closing date for entries, which must be in the form of photographs, is October 23rd and entry forms and full particulars of the competition may be obtained from the Editor, *Carpet Review*, 222, Strand, London, W.C.2.

NOTES ON BOOKS

SCIENCE AND COMMON SENSE. *By James Bryant Conant. O.U.P.*, 1951. 21*s*

A few years ago Dr. Conant wrote a book, *On Understanding Science*, in which he described how an historical approach to science by means of 'case histories' of major discoveries had enabled students of the arts and humanities to appreciate science. The present work stems from this earlier book, but has been written to explain science and its methods to the general reader rather than to discuss a method of educating undergraduates.

Scientists by reflection on their experience can attempt some general description of science: laymen must rely on reports of scientific work. These accounts of experiments are best understood by non-scientists if examples from the science of the seventeenth and eighteenth centuries are chosen, for experimental methods were not complicated and the subjects of enquiry are now almost commonplace in our general heritage. Dr. Conant therefore draws upon the history of science for the 'case histories' which illustrate and illuminate his arguments.

In addressing a general audience the author has assumed a considerable facility in dealing with abstractions as is demonstrated by his definition of science as 'an interconnected series of concepts and conceptual schemes that have developed as a result of experimentation and observation, and are fruitful of further experimentation and observations'. Since Dr. Conant defines his terms readers will be able to meet such frequently occurring phrases as 'a limited working hypothesis' with equanimity.

Besides fulfilling its main function of explaining the methods of science this book gives very clear accounts of many of the more important periods in the history of science, an achievement of some magnitude.

D. J. B. COPP

SHORT NOTES ON OTHER BOOKS

MAN AND THE CHEMICAL ELEMENTS. *By J. Newton Friend. Griffin*, 1951. 27*s* 6*d*

Having explained what a chemical element is, the author here describes the discovery of each, and its uses; the book is in fact a history of the effect on human life of these elements, 'from Stone-Age hearth to the cyclotron'. It is designed for the general reader.

FOUR WALLS ADORNED. *By Iris Brooke. Methuen*, 1952. 37*s* 6*d*

Miss Brooke here describes and illustrates with many drawings the way in which the builder of the smaller English house has, from 1485 to 1820, decorated walls, ceilings, and fireplaces. She discusses papers, painted decoration, panelling, and carving, plaster work, and mirrors, and gives examples taken from houses where they may still be seen. The sepia drawings are most attractive.

WALL-PAINTINGS BY SNAKE CHARMERS IN TANGANYIKA. *By H. Cory. Faber*, 1953. 36*s*

The thirty-seven paintings here reproduced, which are connected with the rites of initiation into a secret society of snake charmers, are interpreted by the author, whose brief introduction describes the circumstances in which they are produced. Mr. Cory is Government Anthropologist in Tanganyika.

MEDIEVAL CARVINGS IN EXETER CATHEDRAL. *By C. J. P. Cave. Penguin Books*, 1953. (*King Penguin No.* 41.) 4*s* 6*d*

These fine photographs, chiefly of roof bosses and corbels, are prefaced by a note on the art of the Exeter carvers by Nikolaus Pevsner. The notes on the 64 plates explain the meaning of the subjects chosen.

FROM THE JOURNAL OF 1853

VOLUME I. 2*nd September*, 1853

From Proceedings of Institutions

MELBOURNE ATHENÆUM, DERBYSHIRE.—The foundation stone of this Institution was laid on Saturday, by Lord Palmerston, in the presence of a large concourse of spectators from various parts of Derbyshire and Leicestershire. . . .

LORD PALMERSTON said, Ladies and Gentlemen, it has afforded me great pleasure to assist in laying the foundation of so interesting a building as that which is to be erected on the spot where we now stand. It is indeed a building of peculiar interest, because it is designed to be, I may say, an epitome of the life of man, as well as an exemplar of the civilization and improvement of the age. It is to contain, in the first place, a provision for infancy in the form of an Infant-school; in the next place, a provision for the instruction and amusement of man in his maturer years, in the shape of a Mechanics' Institution; and lastly, in the form of a Savings-bank,—a provision for advanced and declining age. . . . I look, therefore, on this triple Institution as one, perhaps, of greater interest than any institutions that were ever before brought together under one roof, because it combines a care for man from his infancy to his most advanced age—because it provides those means which the improved civilization and greater knowledge of the times has pointed out as useful to all classes of the community. I trust that this day will be one auspicious to Melbourne.